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NOTICE OF ALLOWANCE AND FEE(S) DUE

22879 7590 02/10/2011

HEWLETT-PACKARD COMPANY
Intellectual Property Administration
3404 E. Harmony Road
Mail Stop 35
FORT COLLINS, CO 80528

EXAMINER

VIEAUX, GARY C

ART UNIT

PAPER NUMBER

2622

DATE MAILED: 02/10/2011

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/698,926

10/31/2003

D. Amnon Silverstein

200206546-1

2987

TITLE OF INVENTION: IMAGING APPARATUSES, IMAGE DATA PROCESSING METHODS, AND ARTICLES OF MANUFACTURE

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1510	\$300	\$0	\$1810	05/10/2011

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

**Complete and send this form, together with applicable fee(s), to: Mail Mail Stop ISSUE FEE
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P.O. Box 1450
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INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

22879 7590 02/10/2011

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Intellectual Property Administration
3404 E. Harmony Road
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Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/698,926 10/31/2003 D. Amnon Silverstein 200206546-1 2987

TITLE OF INVENTION: IMAGING APPARATUSES, IMAGE DATA PROCESSING METHODS, AND ARTICLES OF MANUFACTURE

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
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nonprovisional NO \$1510 \$300 \$0 \$1810 05/10/2011

EXAMINER	ART UNIT	CLASS-SUBCLASS
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VIEAUX, GARY C 2622 348-294000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

- (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, 1 _____
- (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. 2 _____
- 3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☐ Issue Fee
- ☐ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies _____

4b. Payment of Fee(s); (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)

- ☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____

Date _____

Typed or printed name _____

Registration No. _____

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/698,926	10/31/2003	D. Amnon Silverstein	200206546-1	2987
22879	7590	02/10/2011	EXAMINER	
HEWLETT-PACKARD COMPANY Intellectual Property Administration 3404 E. Harmony Road Mail Stop 35 FORT COLLINS, CO 80528			VIEAUX, GARY C	
			ART UNIT	PAPER NUMBER
			2622	
			DATE MAILED: 02/10/2011	

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 819 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 819 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

Notice of Allowability	Application No.	Applicant(s)	
	10/698,926	SILVERSTEIN, D. AMNON	
	Examiner	Art Unit	
	Gary C. Vieaux	2622	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to Request for Continued Examination dated December 23, 2010.
2. ☒ The allowed claim(s) is/are 1-11, 15-22 and 27.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: ____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date ____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date ____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|---|--|
| <ol style="list-style-type: none"> 1. <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) 3. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date ____ 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | <ol style="list-style-type: none"> 5. <input type="checkbox"/> Notice of Informal Patent Application 6. <input type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date ____. 7. <input type="checkbox"/> Examiner's Amendment/Comment 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance 9. <input type="checkbox"/> Other ____. |
|---|--|

/Jason Chan/
 Supervisory Patent Examiner, Art Unit 2622

EXAMINER'S STATEMENT OF REASONS FOR ALLOWANCE

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114 was filed in this application after a decision by the Board of Patent Appeals and Interferences, but
5 before the filing of a Notice of Appeal to the Court of Appeals for the Federal Circuit or the commencement of a civil action. Since this application is eligible for continued examination under 37 CFR 1.114 and the fee set forth in 37 CFR 1.17(e) has been timely paid, the appeal has been withdrawn pursuant to 37 CFR 1.114 and prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicant's
10 submission filed on December 23, 2010 has been entered.

Amendment

In response to the decision by the Board of Patent Appeals and Interferences, dated October 27, 2010, and the Final Rejection, dated November 1, 2007, claims 1,
15 10, 17 and 27 have been amended.

Claims 24-26 were cancelled in the response dated April 30, 2007, and claims 12-14 and 23 were canceled in the response dated August 17, 2007.

Allowable Subject Matter

20 **Claims 1-11, 15-22 and 27** are allowed.

The following is an examiner's statement of reasons for allowance:

Regarding claims 1-9, the prior art is not found to teach or fairly suggest, an imaging apparatus comprising an optical device configured to receive light and to provide a plurality of color components of the received light; an image sensor including a plurality of color sensor arrays arranged elevationally over one another and configured to receive respective ones of the color components, and the color sensor arrays individually comprising a plurality of sensors configured to provide image data for a plurality of pixels of a respective one of the color components at an initial resolution, and a processing mechanism, wherein the plurality of color sensor arrays overlap and are offset with respect to one another to define a plurality of sub-pixels for individual ones of the pixels, and processing circuitry configured to access the image data for pixels from each of the plurality of color sensor arrays, and using the accessed image data, to determine sub-pixel image data for the respective sub-pixels to form an image of an increased resolution compared with the initial resolution of the color sensor arrays, wherein a given pixel of the pixels has a given sub-pixel having a plurality of red components including a given red component, a plurality of green components including a given green component, and a plurality of blue components including a given blue component, and wherein the processing mechanism is to generate a blue intensity of the given sub-pixel based on a mean of the blue components multiplied by a sum of the given red component and the given green component, and divided by a sum of a mean of the red components and a mean of the green components, a red intensity of the given sub-pixel based on a mean of the red components multiplied by a sum of the given blue component and the given green component, and divided by a sum of a mean

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of the blue components and a mean of the green components, and a green intensity of the given sub-pixel based on a mean of the green components multiplied by a sum of the given red component and the given blue component, and divided by a sum of a mean of the red components and a mean of the blue components.

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Regarding claims 10, 11, 15 and 16, the prior art is not found to teach or fairly suggest, an imaging apparatus comprising an image sensing means implemented as a single device, and including a plurality of color sensor arrays, individual sensor arrays comprising a plurality of sensor means for providing image data for a plurality of pixels

10 of a respective color component at an initial resolution, wherein individual ones of the sensor arrays are arranged elevationally over one another in a layered stack of the image sensing means for individually detecting red, green, and blue components of light, respectively, wherein the plurality of sensor means of respective color sensor arrays are arranged in an offset relationship with respect to one another in the single

15 device for defining a plurality of sub-pixels for individual ones of the pixels, and processing means for accessing the image data for at least one pixel from each of the plurality of color sensor arrays, and using the accessed image data, to form an image of an increased resolution compared with the initial resolution of the color sensor arrays, wherein a given pixel of the pixels has a given sub-pixel having a plurality of red

20 components including a given red component, a plurality of green components including a given green component, and a plurality of blue components including a given blue component, and wherein the processing means is for generating a blue intensity of the

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given sub-pixel based on a mean of the blue components multiplied by a sum of the given red component and the given green component, and divided by a sum of a mean of the red components and a mean of the green components, a red intensity of the given sub-pixel based on a mean of the red components multiplied by a sum of the given blue component and the given green component, and divided by a sum of a mean of the blue components and a mean of the green components, and a green intensity of the given sub-pixel based on a mean of the green components multiplied by a sum of the given red component and the given blue component, and divided by a sum of a mean of the red components and a mean of the blue components.

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Regarding claims 17-22, the prior art is not found to teach or fairly suggest, an image data processing method comprising: providing image data using an image sensor, and the providing comprising receiving light travelling in a direction using an optical device, using the optical device, providing the light into a plurality of light components corresponding to different wavelengths of the light and outputting individual ones of the light components in the same direction of travel of the received light, receiving the light components using a plurality of color sensor arrays of the image sensor, wherein the color sensor arrays have an initial resolution, generating image data using the color sensor arrays, and accessing the image data from each of the plurality of color sensor arrays, and forming an image having an increased resolution compared with the initial resolution of the color sensor arrays using the accessed image data, wherein a given pixel of the image data has a given sub-pixel having a plurality of

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red components including a given red component, a plurality of green components including a given green component, and a plurality of blue components including a given blue component, and wherein forming the image comprises generating a blue intensity of the given sub-pixel based on a mean of the blue components multiplied by a sum of the given red component and the given green component, and divided by a sum of a mean of the red components and a mean of the green components, a red intensity of the given sub-pixel based on a mean of the red components multiplied by a sum of the given blue component and the given green component, and divided by a sum of a mean of the blue components and a mean of the green components, and a green intensity of the given sub-pixel based on a mean of the green components multiplied by a sum of the given red component and the given blue component, and divided by a sum of a mean of the red components and a mean of the blue components.

Regarding claim 27, the prior art is not found to teach or fairly suggest, an article of manufacture comprising a processor-usable medium comprising processor-usable code configured to cause processing circuitry to perform processing comprising accessing image data for at least one pixel from each of a plurality of color sensor arrays at an initial resolution, and forming an image of increased resolution, compared with the initial resolution of individual ones of the color sensor arrays, using the accessed image data, wherein the color sensor arrays are offset with respect to one another providing a plurality of image data values for at least one color component for a single pixel location and wherein a sum of the image data values comprising intensity

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values for a single color component for the single pixel location are equal to an intensity value of the accessed image data for the single color component for the single pixel location, wherein a given pixel of the image data has a given sub-pixel having a plurality of red components including a given red component, a plurality of green components including a given green component, and a plurality of blue components including a given blue component, and wherein forming the image comprises generating a blue intensity of the given sub-pixel based on a mean of the blue components multiplied by a sum of the given red component and the given green component, and divided by a sum of a mean of the red components and a mean of the green components, a red intensity of the given sub-pixel based on a mean of the red components multiplied by a sum of the given blue component and the given green component, and divided by a sum of a mean of the blue components and a mean of the green components, and a green intensity of the given sub-pixel based on a mean of the green components multiplied by a sum of the given red component and the given blue component, and divided by a sum of a mean of the red components and a mean of the blue components.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent No. 3,717,724 to Montgomery teaches a solid state image sensor in
5 a stacked layer arrangement based on the wavelength absorption of a given color.

U.S. Patent No. 5,965,875 to Merrill teaches a solid state image sensor with a triple-well configuration.

U.S. Patent No. 6,429,953 to Feng teaches a solid state image sensor with an overlapping and offset arrangement.

10 U.S. Patent Publication No. 2004/0178465 to Merrill teaches a vertically stacked, multi-color, solid state image sensor.

U.S. Patent No. 7,511,866 to Feng teaches a solid state image sensor with an overlapping and offset arrangement.

Contact

15 Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gary C. Vieaux whose telephone number is (571)272-7318. The examiner can normally be reached on IFW.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's
20 supervisor, Jason Chan can be reached on 571-272-3022. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only.

- 5 For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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Gcv2
/Jason Chan/
Supervisory Patent Examiner, Art Unit 2622